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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/554,708	10/27/2005	Dong Ryul Kim	29137.109.00	9230

7590 06/11/2008

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EXAMINER	
TESKIN, FRED M	
ART UNIT	PAPER NUMBER
1796	
MAIL DATE	DELIVERY MODE
06/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/554,708	KIM ET AL.	
	Examiner	Art Unit	
	Fred M. Teskin	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1,3-11 and 20-29* is/are allowed.

6)☒ Claim(s) *2 and 12-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20051027; 20060921*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

This Office action is responsive to application filed on 27 October 2005; claims 1-29 are currently pending and under examination.

The disclosure is objected to because of the following informalities: In Comparative Example 1, the reference to "isoprene amine" (see page 16, line 22) appears to be in error. Note that, except for a difference in pressure, Comparative Example 1 repeated Example 1, wherein isopropyl amine was used as an imidizing agent (*cf.*, page 14, lines 2-3). Clarification and appropriate correction are required.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2 and 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5639801 (Mallikarjun I) in view of US 5442041 (Mallikarjun II).

Mallikarjun I relates to methods for processing anhydride group-containing thermoplastic resins by an extrusion process wherein the concentration of volatile residues in such resins may be reduced simultaneous with imidization of the anhydride functional groups. As disclosed (col. 1, line 55 to col. 2, line 10), the process involves extruding in a vented extruder an anhydride group-containing thermoplastic resin and a nitrogen-containing blowing agent under vacuum and at a temperature sufficient to transform a nitrogenous chemical blowing agent into decomposition products, react at least a portion of the decomposition products with the anhydride group-containing resin to convert at least a portion of the anhydride groups thereof to imide groups, and removing through the vent(s) a gaseous mixture comprising a portion of the volatile residues and an *in-situ* generated stripping agent selected from water (generated by imidization) and another portion of said decomposition products. It is indicated that the dual activity of the nitrogenous chemical blowing agent may be due to the fact such agents form reactive nitrogen-containing species (e.g., ammonia, RNH_2 amine) as well as inert gases such as carbon dioxide, nitrogen and the like *in situ* at elevated temperatures (col. 3, lines 25-45). Hydrazine-based and ammonium-based chemical blowing agents are said to be especially preferred (*Id.*, lines 47+), and species of each are used as the nitrogenous chemical blowing agent in the extrusion processing of a copolymer of styrene and maleic anhydride (Example Nos. 1-2). The effectiveness of these chemical blowing agents in both promoting the removal of residual styrene

monomer and increasing the glass transition temperature (indicative of imidization of the anhydride groups) is demonstrated (see Tables I-II).

Mallikarjun I differs from the claimed subject matter mainly in failing to teach blending of copolymers of styrene and maleic anhydride with an imidizing agent and *supercritical* carbon dioxide. In this regard, however, it is known from Mallikarjun II (col. 1, line 5-15 and col. 2, lines 40-45) that volatile impurities such as styrene monomer may be removed from thermoplastic resin such as styrene/maleic anhydride copolymer by admixing with a chemical blowing agent and extruding under a vacuum. The chemical blowing agent is converted into a gas such as carbon dioxide during extrusion and the gas is removed, along with the volatile impurities, via vent(s) in the extruder. Where the chemical blowing agent functions as source of CO_2, it is stated that the process may be operated such that "the liberated carbon dioxide is maintained in the supercritical state for at least a portion of the extruder residence time of the molten thermoplastic resin ... the extruder and screw design and extrusion conditions may accordingly be selected to assure the formation of supercritical carbon dioxide capable of providing good stripping action in the resin." (Mallikarjun II, col. 4, lines 10-18.)

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of applicants' invention to undertake the extrusion processing of Mallikarjun I under conditions such that the carbon dioxide formed *in-situ* by decomposition of the chemical blowing agent is maintained in a supercritical state. The expectation of thereby achieving enhanced stripping action consistent with the teachings of Mallikarjun II along with simultaneous imidization of the anhydride groups of a styrene/maleic anhydride

copolymer would have provided ample motivation to so modify the primary art and arrive at the presently claimed invention.

The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.

Canova et al is cited as pertinent to imidization of copolymers of styrene and maleic anhydride (note Table 1).

Claims 1, 3-11 and 20-29 are allowable on the present record. To prepare copolymers of styrene and maleimide by blending copolymers of styrene and maleic anhydride with an imidizing agent in a supercritical state is neither disclosed nor adequately suggested in the available prior art.

Any inquiry concerning this communication should be directed to Examiner F. M. Teskin whose telephone number is (571) 272-1116. The examiner can normally be reached on Monday through Thursday from 7:00 AM - 4:30 PM, and can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The appropriate fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Fred M Teskin/
Primary Examiner, Art Unit 1796